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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 146

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LATIN AMERICA

NEAR EAST AND NORTH AFRICA

SUB-SAHARAN AFRICA

WEST EUROPE

BRIEFS

CANADA-EGYPT NUCLEAR AGREEMENT--Canada and Egypt have signed a 30-year nuclear cooperation agreement. At a news conference in Ottawa, Federal Energy Minister [title as heard] Marc Lalonde made it clear that the agreement simply opens the door to future discussions on the development of nuclear energy for peaceful purposes. Mr Lalonde and his Egyptian counterpart, Mahir Abaza [name as heard], who is in Ottawa to sign the agreement, told reporters that pact marks another important step in increasing relations between the two countries. Among other things, the deal may include the possible sale of Candu nuclear reactors, the supply of uranium, implementation of joint nuclear research programs and the exchange of technology. [Text] [LD171950 Montreal International Service in English 1900 GMT 17 May 82] The agreement also provides for the exchange of experts and the training of Egyptian experts in the fields of security and safety systems for nuclear power stations and environmental protection. Canada will provide Egypt with assistance in prospecting for nuclear raw materials, such as uranium, and development of these resources. [Excerpt] [NC171559 Cairo Domestic Service in Arabic 1400 GMT 17 May 82]

CSO: 5100/2170

'EXPRESS' REVIEWS PERILS OF S. ASIA NUCLEAR RACE

BK091240 Delhi INDIAN EXPRESS in English 26 Apr 82 p 6

[Article by Pran Chopra: "Our Nuclear Nightmare"]

[Text] If some recent discussions in New Delhi are any indication, the current conventional arms race between India and Pakistan will first worsen, and then escalate into a nuclear arms race not many years hence. It is ironic that this prospect should begin to crystalise so soon after the two countries appeared to be so close to discussing a non-aggression agreement. But while the very prospects of peace might have sparked warlike thoughts among some quarters in both countries, quarters whose own interests are best served by mutual tension, the nightmare of nuclear competition between India and Pakistan has begun to look unavoidable even to those who ardently wish the two countries would foreswear the use of force in settling any dispute between them.

Two seminars have been held in New Delhi in recent weeks, one on the general theme of India's security environment, and the other more specifically on India's nuclear options. The participants in both included some of the more thoughtful among our former and present politicians, administrators, academics, journalists, recently retired but very senior men of the armed forces. Some participants had held top positions in the conduct of wars in which India first defeated Pakistan and, the next time round, dismembered it.

While at both seminars there was the inevitable diversity of opinion on nearly all matters, two basic propositions were opposed by no one and supported by everyone who spoke about them. First, India should make it plain to Pakistan, and to everyone else, that next time it is attacked by Pakistan, India will not stop the war at a time of Pakistan's or anyone else's choosing. It will wage it as long as it thinks it necessary for making Pakistan incapable of waging another war. It was contended by some participants that with the help of sophisticated weapons acquired from the U.S.A., Pakistan might gain initial advantage in a surprise attack. If international pressures then brought the war to a quick end, Pakistan would be able to retain the gains. Therefore, everyone agreed that next time India must fight as long as it took it to mobilise its war potential in depth and then destroy Pakistan's offensive capability for good.

The second point of near unanimity was that should Pakistan go nuclear, no party and no government in India would be able to resist the demand that India must go nuclear too. Many participants said so more in sorrow than anger, reluctantly accepting this conclusion as a hard fact of political life. But many others urged it as the logical corollary of the consensus that if there was another war, India must fight it to the finish. They argued successfully that if Pakistan had nuclear weapons, even if only a few, and India had none, then Pakistan would be tempted to try to exploit its greater sophistication in conventional weapons to make a quick grab of some Indian territory, say in Kashmir, and then rattle its bomb to scare India out of making a counterattack.

From this point it follows inevitably that just as in conventional so in nuclear weapons, India must maintain a telling superiority over Pakistan, and for the same reason, deterrence. India's superiority must be so great, and must be seen to be so great by Pakistan, that Pakistan would dare not try any adventures against India. If it is true of a conventional Pakistani attack that it is better prevented than punished, it is even more true of a Pakistani nuclear attack that it is better deterred than rewarded with overwhelming retaliation. It would not be hard for India to absorb the damage Pakistan may inflict in a surprise attack with conventional weapons. But a surprise nuclear attack can cause so much damage that even the subsequent destruction of Pakistan would be poor comfort for India. Therefore, a nuclear attack must be deterred with an even more overwhelming nuclear superiority. But, of course, it also follows with equal inevitability that, just like the two super powers, in a tragic parody the two puisne powers of South Asia will also push each other into the MAD [mutually assured destruction] doctrine of defence: mutually assured destruction as a means of achieving some kind of a no-war relationship which passes for peace.

Exploring the nuclear theme a little deeper, the costs of this inevitable escalation stood out horrendously. Some of the papers prepared for the seminar by the Centre for Policy Research show that the costs, though difficult to calculate, are crippling by any reckoning. The papers do not represent CPR's views. In fact, CPR has none; the purpose of the papers was only to distill present knowledge on various aspects of the subject and to underpin the discussion thereon with this information. But they do bring out, and so did the greater part of the discussion generated by them, how ruinous the costs can be as India and Pakistan continue and escalate their confrontation.

One paper shows that for a not very ambitious nuclear arsenal ("a rather small one," the paper calls it), an enormous cost has had to be borne by France, a country whose example is particularly relevant to India because, as the paper points out, "France had no help from anyone in developing its deterrent," as will be the case with India, too. "Between 1955 and 1980, France spent approximately U.S. $20,000 million to achieve a force of approximately 120 strategic launchers" and was expected to have spent $4 billion more in 1981 alone. In completing its programme for this force through 1995, France will end up with a bill of $60,000 million. To achieve a similar nuclear capability, India would need to spend the equivalent of $75,000 million in the next 15 years because it would have to start from a lower technological base. This means the budget for nuclear defence alone for the next 15 years would be U.S. $5,000 million, or just under Rs 5,000 crore a year, which is equal to the present, significantly stepped up, annual defence budget.

The theoretical calculation is sometimes made that for each billion invested in them, nuclear weapons can inflict more damage on the enemy than conventional weapons can, and therefore are most cost effective. But the papers and arguments presented at the CPR seminar shot down any expectation that investment in nuclear weapons would mean any saving in the expenditure on conventional weapons. No country has been able to reduce expenditure on conventional weapons for the reason merely that it has gone in for their nuclear cousins. And this for the very simple reason that in the given international climate, it is awfully difficult for any country to give a nuclear riposte to a conventional attack and thus become the first country to use the nuclear bomb after World War II.

Even the United States, which had already lost its virginity at Hiroshima, had to accept stunning reverses in North Korea, and that too at the hands of (at that time) a non-nuclear China, and had to accept humiliating defeat from a non-nuclear Vietnam, rather than win either war, as it could have by using the nuclear bomb. Therefore, as long as the scenario of our relations with Pakistan is presided over by war, superiority over Pakistan in conventional weapons will have to be maintained irrespective of the superiority obtained (if it is) in nuclear weapons.

This has enormous implications for India, first financial and then, as a consequence, security-wise. If some friends of Pakistan can keep stoking up Pakistan's arms arsenal, and if India continues to succumb to the temptations of escalation -- and I too do not see what else India can do so long as relations with Pakistan continue to be what they are -- the defence drain on India's economy will continue until first the economy is ruined and then security lost as a consequence. Those who wish to see India weakened will thus achieve their aim better by this indirect means than they could in the past by more direct means.

India faced the same danger in relation to China in 1962 but, fortunately, overcame that; she is not in a conventional or nuclear arms race with China. But India will never drop out of an arms race with Pakistan. Therefore, defence will remain an open wound in the Indian economy as long as Pakistan is able to keep it open with the help of others. That, in the process, Pakistan itself will become a slave of some money-lender will be of little comfort to India.

I wonder, as also does one of the working papers placed before the CPR seminar, whether in the midst of our rejoicing over the Pokharan explosion, or in the midst of the subsequent inaction in nuclear development, we thought the consequences through. If the Pokharan explosion had not occurred, Pakistan would not have been spurred on the nuclear path and a nuclear race between the two neighbours would not have ensured. Alternatively, if immediately after Pokharan, India had quickly assembled a credible arsenal, Pakistan might have been deterred out of entering a race, just as India has not entered into a race with China, knowing that the gap is too large to close.

The contrary view advanced by some Indian experts is that since Bhutto began to talk about a Pakistani bomb two years before the Pokharan explosion, and called it Islamic, Pakistan's nuclear ambitions belong to a content different from and wider than the subcontinental and are not focussed upon India. This logic is too clever by half. The nuclear debate began in India immediately after China exploded its first bomb in 1964. Within a few years it became common knowledge that India had acquired some sort of nuclear capability. A neighbour who wanted to react did not have to wait for Pokharan. If Bhutto chose to call it Islamic it was only to make the programme more fundable by the Arabs, not to reassure us. I find it strange that the same people in India who insist that Pakistan is acquiring the F-16's only for use against India also argue that Pakistan's nuclear aspirations are not India-oriented. The purpose of this sophistry I do not know, except if it be to say indirectly that since its nuclear focus lies elsewhere, Pakistan will not barter away its bomb against India's. Is this an attempt to preempt such case as there may be for a no-bomb pact with Pakistan?

The case for such a pact is, in all conscience, very feeble. But if there is a case it has to be explored with the few years remaining before Pakistan also stages an explosion or whatever else. Once it does, the die will be cast. Theoretically, there will be room even then for arguing that the two countries should reach a nuclear force levels agreement, instead of chasing each other up the nuclear escalator until both fall down dead. But their failure to reach such an agreement even on conventional weapons, in which the problems of trust and the costs of misplacing it are much less, does not augur well.

CSO: 5100/2171

BRIEFS

CANADA BLAMED FOR FAULTY EQUIPMENT--New Delhi, 10 May (AFP)--Indian nuclear scientists have accused Canada of supplying defective equipment for the Rajasthan atomic energy plant in north-west India, which has had 251 breakdowns since its commissioning nine years ago. "Canada has indeed done its (?experiments at the cost of) India," the Indian news agency UNI quoted the scientists as saying in a report published today. They said the recurring trouble at the Rs. 1,650 million (about 183 million U.S. dollars) plant might plague it for all its life unless drastic changes were made. The plant's equipment was supplied by Canada under an agreement with the Indian Government. The 440 megawatts plant, which has never worked at more than 60 percent of its capacity, was shut down indefinitely on March 4. The latest trouble in one of the two units has been ascribed to leakage in one of the operational tubes. [Text] [BK111715 Hong Kong AFP in English 0600 GMT 10 May 82]

CSO: 5100/2171

BRIEFS

KOZLODUY STATION CAPACITY INCREASES--Sofia, 18 May (BTA)--The fourth power block of the Kozloduy atomic electric power station has been put on stream. With the new 440 megawatt the total capacity of the station became 1,760 megawatt. The Kozloduy atomic electric power station which in 1974 sent on the power lines of Bulgaria the first atomic electric energy, is one of the biggest sites of Bulgaro-Soviet technical cooperation. This cooperation started already with the designing of the first capacities of the station and continues till the present day--with the construction of a new 1,000 megawatt reactor. Atomic power generation is defined as one of the main trends of development of the Bulgarian power economy. Now the Kozloduy atomic electric power station holds one-fifth of the total energy output in Bulgaria. According to forecasts, in the future this share will be increasing. For her own energy base and for the needs of the other CEMA countries Bulgaria has already specialized in the manufacture of a specific kind of equipment for atomic electric power stations. [Text] [AU181940 Sofia BTA in English 1836 GMT 18 May 82]

CSO: 5100/2170

USSR'S ANTONOV VISITS NUCLEAR CONSTRUCTION SITES

Dukovany, Jaslovske Bohunice Visited

LD181926 Prague Domestic Service in Czech 1630 GMT 18 May 82

[Text] Aleksey Antonov and Ladislav Cerle, nuclear energy cooperation plenipotentaries from the Soviet Union and Czechoslovakia, visited the construction site of the nuclear power station at Dukovany today. They acquainted themselves in detail with the progress of the power station's construction; the first power unit is to be commissioned in September 1981. Comrade Alekse~ Antonov noted that the project is being built according to high standards and on a broa. scale.

From Dukovany Comrades Alekaev Antonov and Ladislav Cerle went to Jaslovske Bohunice. They were interested in the current progress of the construction of the decisive building and assembly sections of the V-2 nuclear power station. They also assessed the future progress of construction and emphasized that it is necessary to strengthen the building and assembly capacities and to organize work on an around-the-clock basis.

Nuclear Cooperation Agreement

LD182100 Prague Domestic Service in Czech 1930 GMT 18 May 82

[Text] The deliberations of the plenipotentaries of the governments of Czechoslovakia and of the Soviet Union devoted to implementing the program of cooperation in nuclear energy ended in Prague today with the signing of a protocol. Deputy Premier Ladislav Cerle and Aleksey Antonov, deputy chairman of the Council of Ministers, discussed the main questions connected with the gradual completion of the projects now under construction and with preparations for the construction of further energy projects. The protocol defines in concrete terms measures for the completion of the energy units in the power stations at Jaslovske Bohunice and Dukovany and covers cooperation in the design of the nuclear power stations at Mochovce and Temelin.

CSO: 5100/2170

FUTURE DEVELOPMENT OF NUCLEAR POWER INDUSTRY OUTLINED

Warsaw TRYBUNA LUDU in Polish 21 Apr 82 pp 1, 2

[Report on interview with Deputy Premier Andrzej Jedynak by Slawomir Popowski, PAP journalist, prepared by (ak)]

[Text] In connection with the Council of Ministers resolution, passed in January of this year, on beginning the construction of the first Polish atomic power plant in Zarnowiec, PAP journalist Slawomir Popowski conducted an interview with Deputy Premier Andrzej Jedynak.

The program for the development of the nuclear power industry, the deputy premier said, is being considered as a part of the total program of the development of the power industry in Poland to the year 2000. At present the basic variant is being considered, in which it is envisaged that 10,760 MW of generating capacity will be installed in nuclear power plants by the year 2000, and the potential of expanding this program by an additional 4,000 MW is also being investigated. Thus, in the 1990's the nuclear power industry should ensure half the increase in new power output. This program is technically realistic, although lower in relation to our needs than the possibilities that arose within the framework of CEMA through the guaranteeing to us, during 1981-1990, of deliveries of fuel and equipment for nuclear electronics not produced in Poland.

A decision has now been made to build two power units, 440 MW each, in Zarnowiec, by 1990. At the same time, we will participate in the construction of a nuclear power plant in Khmel'nitskiy, in the USSR, as a result of which, beginning in 1984, we will receive electric energy, initially in an amount equivalent to 200 MW output, until a level of 1,000 MW is reached in 1988. In addition to the Zarnowiec power plant, the locating of the next one, "Kujawy", in the Wloclawek area, is being considered. Four power units rated at 1,000 MW each, would be installed there. Deputy Premier A. Jedynak said that atomic energy is an essential and single source for satisfying the country's energy needs during 1990-2000 and later. The nuclear power plant construction program mentioned will make it possible to replace approximately 30 million tons of hard coal annually and relieve the burden on transportion. It should also be borne in mind that our hard coal resources are limited, and mining them is and will be more and more difficult (depth of the mines, working conditions, etc.) Brown coal is, certainly, a big help, but it is not an unlimited source of fuel. Nor should we overlook the adverse affects that the exploitation of these deposits has an agriculture.

In answering questions on the dangers of atomic energy, the deputy premier said that human exposure to radiation, research has shown, is less than 1 percent of the exposure to natural radiation (cosmic radiation, natural radioactive elements) and that applied in medicine (radiological research). It is also a fact that the few failures that occurred during the over 25 years of operation of industrial nuclear power plants (at the end of 1981 there were 266 power units with a combined capacity of 148,477 MW in operation), did not cause even one case of a threat to life through radiation to the service personnel in these power plants or to persons living in the area of these plants.

The entire nuclear industry in all countries of the world was, from the beginning of its existence, subject to very severe, detailed technical requirements as to materials used, technologies, design, and finally, operation. The investment process, i.e., siting, designing and construction of a nuclear power plant, is subject to strict regulations and is supervised by the investor on one hand and by an independent state organization on the other hand. In our case, the investor will be the Ministry of Mining and Power Industry, and supervision, from the standpoint of safety, will be exercised by the State Atomics Agency. That is why, among other reasons, this Agency was recently formed. Only after a safety report is approved will a license be issued for the construction and startup of a power plant. The personnel undergoes special training before it is permitted to go to work. The safety regulations in effect in CEMA and now being prepared in Poland are, of course, in accordance with those of the world regulations. From the technical standpoint, of greatest importance is the fact that every nuclear power plant reactor is equipped with multiple, automatic-operation safety systems.

These strict performance and operation requirements, applied consistently, are responsible for the fact that the nuclear power industry is regarded universally as the safest subsector of industry. The matter of nuclear power plant radioactive wastes also has been fully resolved. These are wastes which are processed entirely by controlled technologies and are stored under supervision in storage facilities. Studies are now being conducted in Poland on the selection of the type and location for storage facilities for these wastes.

The Council of Ministers' recent resolution, dated 18 January of this year [1982], was passed with the full awareness that the construction of a nuclear power plant in Zarnowiec, as the beginning of Polish nuclear power, is essential. Undertaking it during such an economically difficult period attests to the importance that the Polish People's Republic's government attaches to the development of the Polish power industry, and we must bear in mind that is the basis of our entire economy, and that its planning will require many years of lead time. The Ministry of Mining and Power Industry, which is in favor of building this power plant, has already begun work on organizing the construction of the first power unit in Zarnowiec. The 1989 target date for startup of this unit is realistic.

Further information obtained from the deputy premier reveals that the first power reactor will be of the pressurized-water type, i.e.. one in which the medium receiving the heat generated as a result of the controlled nuclear reaction, is ordinary water under pressure. This same system is being used as basic equipment in nuclear power plants in the CEMA countries (half of the active reactors in the world operate on this principle). The first power reactor of this type, with a generating capacity of 440 MW, has already been operating for years in the USSR,

Bulgaria and Finland, and a similar one is being built in Czechoslovakia and Hungary. This is an efficient power unit with a well-developed technology, construction of equipment, and operation. Thus the construction of such power units, as the first, is most justified. Using these units we will be able to more easily master this much more difficult, in comparison with the engineering used in the past, construction of a facility and equipment, and then the actual operation.

At present the Soviet Union, within the framework of CEMA, is building larger and more modern power units, also water-pressure, rated at 1,000 MW. The first such power unit is already operating in a power plant in Novovoronezh, and the following ones are being built in the already mentioned Khmel'nitskiy nuclear power plant. These types of power units are also expected to be built in the next Polish nuclear power plants.

Poland, despite the fact that it entered this field late, has already made, and is making a contribution to the building of nuclear power industry in the socialist countries and, obviously, in our own country. In the distribution of deliveries, Poland produces, or is beginning to produce equipment for the 440 MW power units. Their production is based mainly on documentation furnished by the Soviet Union, however, in many cases, the Soviet specialists and ours cooperate closely in improving and modernizing the construction. In addition, the development of the production of nuclear equipment by our industry within the framework of a multilateral agreement of the CEMA countries, assigns us the specialization of production and much of the equipment for the nuclear power industry. Their export, in turn, makes it possible for us to receive deliveries of other indispensable equipment and materials.

This is a long-range problem which we must consistently implement, for it serves not only the nuclear power industry. The new materials and technologies developed for the nuclear power industry are immediately applied in the chemical, machinery, and other industries. Such was, and is, the incidental, but so very important, role of the nuclear power industry in the whole world. It is the proverbial lever of technical progress in every country.

9295
CSO: 5100/3017

BRIEFS

OFFICIAL DISCUSSES NUCLEAR PLANS--Buenos Aires, 15 Apr (TELAM)--The advisor of the National Atomic Energy Commission (CNEA), engineer Jorge Constantino announced here today that Argentina anticipates putting into operation another nuclear plant, possibly in Mendoza, in 1991, but he made it clear that the decision on the subject will be made next year. The official also stated that the Argentine nuclear plan also contemplates the installation of other nuclear plants by 1995 and 1997. Constantino made these statements at the Ezeiza international airport, shortly before leaving for Rio de Janeiro, where he will take on the position of president of the Latin American section of the American Nuclear Society. He then recalled that our country is in an intermediary position in the nuclear field and pointed out that Argentina is in this respect in the same level as Brazil and Mexico. [Text] [PY152132 Buenos Aires TELAM in Spanish 2105 GMT 15 Apr 82]

CSO: 5100/2168

NUCLEAR WASTE TO BE STORED AT ANGRA-I SITE

Rio de Janeiro JORNAL DO BRASIL in Portuguese 11 Apr 82 p 26

[Text] The atomic waste of Angra-I will be kept in a large storehouse at the plant site itself, according to the announcement made yesterday by the chairman of the National Nuclear Energy Commission (CNEN), Hervasio de Carvalho. The announcement puts an end to a succession of speculations, semiofficial announcments and denials that included as sites chosen for the reactor's radioactive waste the municipality of Xerem in the Fluminese Lowland and islands off the Atlantic coast.

All the radioactive material--exchanged water, replaced parts, tools, clothing, gloves and everything that has come into contact with radioactivity--will be put into large ironclad reinforced concrete drums which will be kept in sheds. According to the CNEN chairman, the site chosen at Angra is capable of accumulating the plant's waste for 15 years.

Common Method

Storing the atomic waste near the plant itself is a common technique in many countries, such as in Japan "where there is a special sensitivity surrounding the nuclear issue because of Hiroshima," explained Hervasio during yesterday's visit to the Brazilian Nuclear Corporation (NUCLEBRAS) by the German president, Karl Carstens. Other possibilities are: to take the waste to deserted places or to cast it into the ocean trenches, inside perfectly sealed drums.

The technique chosen for Brazil--at least for the Angra-I waste--is well known to CNEN technicians, said Hervasio. He said that the CNEN and NUCLEBRAS had conducted a number of tests in Belo Horizonte, all of them recorded on videotape.

"In this phase, still operating at low power, Angra-I is still generating an insignificant amount of radioactivity," declared the CNEN chairman. In addition, he explained, the radioactive content of the material stored decreases with time and can drop to a quite low intensity. "An important factor is to use water of the highest quality in the reactor, demineralized water, so that radioactivity will not be produced in the impurities."

Physicist Criticizes

"I doubt that the site selected responds to all of the safety rules for the storage of radioactive wastes. Some of the conditions were certainly fulfilled but I doubt that the site is 100 percent adequate," said physicist Luis Pinguelli, when he learned of the decision announced by Hervasio de Carvalho.

Pinguelli also criticized the temporary nature of the solution found. "What I want to know is how is it going to be when all of the reactors are operating, because in that case there certainly will be no possibility of storing all of the waste at the same site. The decision is a demonstration of half-measures since once again there is not a definite solution to the problem."

The physicist explained that the material that will be stored at the site near Angra-I is the so-called low- and medium-radioactive waste comprised of all the objects that may have come into contact with radioactivity. These wastes must be solidified, treated and packed in drums.

Several rules must be taken into account in choosing a site for the storage of the waste: the site must be away from surface phreatic waters, there must not be any danger of floods or erosion, care must be taken that the subterranean waters that pass close by do not reach waters used by humans, animals or for the irrigation of crops.

8711
CSO: 5100/2154

INTERRELATIONSHIP OF FALKLANDS CRISIS, NUCLEAR ISSUE EXAMINED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 23 Apr 82 p 8

[Commentary by Rubens Rodrigues dos Santos: "The Crisis and the Nuclear Issue"]

[Text] The report that "Argentina is already in a position to build atomic weapons," revealed by Vice Admiral Carlos Castro Madero, chairman of that country's National Atomic Energy Commission, compels us to make some comments on the delicate issue of the balance of military forces in South America, taking into account at the same time the surprising action undertaken by the Argentine Armed Forces in occupying an archipelago that had been under British control for 149 years. It is necessary to be very frank when the pieces are moved on the checkerboard on which South American geopolitics, which very closely interests Brazil, is defined.

If, on the one hand, it is essential to stress the good relations that today draw us close to Argentina--which all Brazilians certainly wish will become closer and closer, on the other hand, it is necessary to take into account the pragmatic consideration that the two countries, separated by the buffer state that is Uruguay, are the largest, most populous and economically strongest in the South American continent, with a long common border and with commercial interests and sociopolitical structures that perhaps may not always coincide in the future.

The first lesson to draw from the bold act of the Argentine military is that their impulsiveness becomes evident once again. It has been demonstrated today in a conclusive manner that they are capable of transgressing any code and all resolutions of international organs--devitalized and therefore insignificant--such as the United Nations and the Organization of American States, when the hegemonic tendency impels them or nationalistic interest urges them.

It is opportune to point out that that can happen--as in the case of the Malvinas--through the action of a catalyst prepared by minorities initially not representative of the Argentina nation, with the object of strengthening themselves internally at the expense of the intensification of nationalism, aroused by an external antagonism. There is not the slightest doubt--history is full of similar incidents--that the invasion of the Malvinas and the

Beagle Channel dispute can represent to the holders of power in the Casa Rosada, if not permanence in the government, at least the temporary interruption of an internal crisis that was on the verge of becoming uncontrollable.

There are those who say, furthermore, that there is a very secret agreement between Buenos Aires and Santiago to keep the Beagle Channel dispute alive as a means of arousing nationalist feelings in both countries.

Who will guarantee us that an impulsive minority of the Argentine military class--whose character and vocation became closely intertwined in the past in the courses given in Germany and Italy before World War II--will not one day carry out actions similar to the ones it is undertaking today against Chile and Britain in order to resolve economic or territorial disputes with its neighbors, or simply to balance possible deficiencies in the area of domestic policy stemming from the fact that the subject nation is not the largest, the most populous, or the one with the greatest potential in the South American continent?

On the other hand, consider the special character of the great majority of the Brazilian military. Our history is there to demonstrate the prudent nature and the tendency toward understanding on the part of our officers, who in the external area have never indulged in extravagant impulses, as slight as they might be. There is firmness and cohesion, of course, in dealing with foreign policy questions, but one cannot deny the almost mystic option of the Brazilian military for neutrality [equidistancia] and moderation in regard to everything that is discussed and disputed beyond our borders. Everything leads one to believe that this is all the result of geographic and sociopolitical factors that characterize us: the territorial vastness and the lack of permanent external antagonism, a situation achieved in the last century by the masterful action of the Baron of Rio Branco; the fact that the majority of the Brazilian military come from middle class families, many of them from distressed regions such as the Northeast; the quest for military unity but never the formation of a caste in Brazilian society.

All of those factors should be evaluated as we face the problem raised by the impulsive action of the Argentine military in the Malvinas, without losing sight at any time of the fact that this is an extremely delicate matter; in analyzing it, we obliged to involve in an apparently unfriendly manner a friendly nation, which must remain so at any cost.

A cost which, in the opinion of some analysts, must include as a basic element the maintenance of military balance in the South American continent, including in the area of nuclear weapons.

A Political Decision

We, thus, come to the complex problem of the development, possession and use of nuclear weapons in Brazil and Argentina.

There are those who oppose any initiative that may lead to the construction of a nuclear device, on the basis of perfectly valid reasons under some ethical, moral, religious and even strategic aspects. In an ideal world, which all yearn for, one could not fail to offer all support to those well-intentioned citizens. However, to our misfortune, the world must still be assessed from a realistic point of view so that the requirements of national security will always be taken care of.

Obviously, we are concerned not so much with that national security conceived in terms of a possible armed conflict (more difficult to occur but not wholly impossible, as the current events demonstrate), but rather in terms of that undeniable surreptitious hegemony that begins to manifest itself in political diplomatic and economical financial areas whenever there is a sign of a glaring military imbalance between neighboring nations, especially between those that are potential competitors.

Different Courses

The governments that thus far have decided to enroll their respective countries in the so-called "Atomic Club"--the United States, the Soviet Union, Britain, France, China and India--had to take three types of decisions in the years preceding their first nuclear explosion:

1. Economic: It was necessary to conclude that they were going to invest huge sums required by that initiative to the detriment of needy sectors of national life. That question was discussed often when India, with serious food and infant mortality problems, exploded its atomic bomb.

2. Technology: A nation must have sufficient specific technology (theoretical and practical knowledge that will enable it to surmount all the phases of construction of an atomic bomb) before deciding if it is advisable to develop a military nuclear project and to culminate it with an explosion. If that specific technology exists to a high degree in the country--as is probably the case in Japan (35 reactors), the Federal Republic of Germany (28), Canada (24), Spain (18), Sweden (12) and Czechoslovakia (11)--it is easier and less expensive to arrive at the atomic bomb. If that technology is not available, possession of that "instrument of persuasion and deterrence" requires that the government, before anything else, decide whether it is advisable to undertake an easier program for the acquisition of nuclear know-how, with more autonomy and at a lower initial cost, using natural uranium and therefore without the need to face the costly enrichment process (that was Argentina's option); or whether it is advisable to take a more difficult course that may require (as in the case of Brazil) an association with countries that already possess the specific technology and are prepared to grant it through compensation of an economic-financial and political-strategic nature, in order to implement a real, rapid and expensive transplant of a whole industrial line and its respective processes, although with less incorporation of technology in the short and medium terms. In this case, the initial cost is higher but there is the possibility of a quick amortization of the investment through the marketing of the electric energy produced.

3. Political: Necessarily, all of the preceding decisions are also political, but that peculiarity becomes more obvious when the country has the full specific technology, lacking only the essentially political decision to use it; that is, to place the plutonium of an appropriate degree of purity in the electromagnetic detonating device; something like putting the powder together with the cap in a revolver bullet.

Change of Course

Angra-I was a first step taken by Brazil to absorb nuclear technology based on a decision taken at the time of the Castello Branco administration, when Brazilian policy was defined in these words of the great Brazilian statesman:

"Historic and geographic realities have enrolled us in the security arrangement of the Western Hemisphere. It provides us with an effective nuclear shield against inclinations of extracontinental aggression, today not very likely in view of the so-called 'balance of terror.' We surely would not have the economic and even technical resources to create our own 'nuclear deterrent,' and if we sought to do so, we would do it at the expense of our economic development and standard of living."

Those prophetic words full of common sense were voiced by President Castello Branco at the War College (ESG) in March 1967.

Brazil was then guided by the "umbrella policy," according to which we should participate in bilateral agreements with the United States so as to have the protection of that power in case international or continental clashes occurred that overtly or covertly involved the military use of atomic energy. At the same time, the country would develop its own nuclear technology in a patient and slower manner, beginning with the "turnkey" (the suppliers turn over the key to the plant when it is ready) that ended up being called Angra-I. Using enriched uranium, we would pursue the moderate option that we mentioned when we referred to the political decision of whether or not to build a nuclear device, we would spend less money, would assure amortization of the investment but would take longer to absorb that so much desired atomic technology.

Everything leads one to believe that that policy, based on the thinking of former President Castello Branco, was opposed by influential sectors of our armed forces--with whom, everything indicates, President Costa e Silva was identified--all of them advocating a line of action independent of the United States in such a manner as to permit Brazil to master nuclear technology as rapidly as possible and thus to be in a position to assemble an atomic bomb, a condition for military balance in South America.

Perhaps the so-much talked about reservation that President Castello Branco made regarding the selection of General Costa e Silva to succeed him as chief of state was due in good part to that difference of views with regard to the Brazilian nuclear program. Only a matter of such strategic importance could have moved a large majority of officers--as occurred--and led them to contradict the prestigious and powerful military man of so many

virtues, who was General Castello Branco, exercising the office of president of the republic and, by virtue of that, the supreme commander of the armed forces. Who knows if the nuclear issue did not really decide the presidential succession in 1967.

The fact is that two significant and highly worrisome facts for the Brazilian military were already becoming evident at that time:

1. The acquisition of nuclear technology by Argentina was occurring at a much faster rate than had been anticipated, which meant that the military of that nation would be in a position in the medium term to take a political decision to put an appropriate amount of chemically pure plutonium in an electromechanical device capable of causing a chain reaction.

2. The United States did not appear to be willing to grant us anything beyond the "turnkey" of the Angra-I type, with an unsatisfactory transfer of technology if Brazil continued to resist the pressures to sign the Treaty on Nonproliferation of Nuclear Weapons.

The threat of an imbalance of forces in the South American continent was thus shaping up; this resulted in strengthening the sectors of the armed forces that advocated a nuclear policy different from that supported by President Castello Branco, who had then already passed the office of chief of state to General Costa e Silva.

It is obvious that such an important change of course could not have been made without the military having faced one of the most crucial dilemmas that has arisen in our history: run the risk of being surprised at any moment in a clearly disadvantageous position, or divert large resources to the nuclear sector, with "the sacrifice of our economic development and standard of living," as President Castello Branco had predicted.

To our misfortune, that illustrious Brazilian was to die immediately afterwards in a plane crash, a fact that further weakened the group of administrators and military men who supported the "umbrella policy."

Brazil-Germany

The construction of the Angra-I reactor by Westinghouse under the form of a U.S. "turnkey" using enriched uranium and light water had already been decided by the time of the Costa e Silva administration, but it was known that Argentina was developing a vigorous and objective program using natural uranium and heavy water, having as its principal unit the Atucha plant.

It is necessary not to forget at any time that neither Brazil nor Argentina signed the Treaty on Nonproliferation of Nuclear Weapons, a fact that shows at least a quite significant reservation of intent.

Finally, on 27 June 1975, the Brazil-Germany Agreement was signed. We would receive all of the technology pertaining to the complete uranium cycle,

including eight plants with a total power of 10,400 megawatts, support for the prospecting of uranium, technology for enriching it and for the construction of equipment intended for the progressive nationalization [share or participation by national industry] of the nuclear plants.

Strangely, however, that agreement did not include--at least overtly--the phase called conversion, which makes it possible to convert the uranium ore into uranium hexafluoride (UF6), which is utilized in the enrichment process. Perhaps in that way, it has been assured that that special segment not inserted in the agreement signed between Brazil and Germany (possibly something like the railroad switch point that permits sidetracking on a railroad trunkline) may remain outside of the safeguard which in fact weighs over the German-Brazilian agreement.

The Brazil-German Agreement, at an estimated cost of more than $30 billion, ended up becoming the disaster that is apparent, with so many political and financial impediments, so many surprises and questions that even the ultimate objective that probably inspired it can only be achieved by unexpectedly long and tortuous parallel roads.

Therefore, two questions are appropro the replies to which, we suppose, will never be given explicitly:

1. Would such a high price, by virtue of a secret parallel agreement, include the preparation somewhere of the plutonium and the electromechanical device that could eventually make feasible a political decision to provide the country with a nuclear weapon in a few hours?

2. In addition to receiving a large sum which ended up assuring the survival of a nuclear industry that was sliding into idleness, could Germany be availing itself of the possibility of continuing to develop a nuclear technology far from the policing that the World War II victorious allies still exercise in such a way as to have today (or to have in the very near future) a German-Brazilian nuclear device available for immediate use?

To Build or Not To Build?

To build or not to build eight nuclear plants; to enrich uranium using the controversial "jet-nozzle" process, of as yet unproven efficiency and economy; to locate the reactors in this or that region; to insure almost of the technology of the uranium cycle: could not all of that be the outer wrapping that we know, discuss and seek to judge vehemently, but the greater aim of which is to protect the secret content of real importance--the nuclear weapon without which the balance of forces would end up being seriously compromised in the South American continent?

After all, it has already been said that even a smart student of nuclear physics could assemble an atomic bomb in the basement of his home. It is obviously an exaggeration but there is not the slightest doubt that today a large number of countries can have available their own nuclear device, by buying or stealing technolgoy, obtaining plutonium from their own reactors or buying it at high prices in a very special underground market, establishing secret agreements on exchange and cooperation based on big financial strokes and complex strategic moves.

BRAZIL, FRG JOINTLY TO OFFER COOPERATION TO THIRD WORLD

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 24 Apr 82 p 27

[Report by correspondent Assis Mendonca]

[Text] Bonn--Brazil and West Germany are jointly going to offer technological cooperation to Third World countries in the area of energy production. That is one of the principal results of the talks held in Munich yesterday between Mines and Energy Minister Cesar Cals and the German minister for research and technology, Andreas von Buelow. That plan falls within the framework of the UN program to make Brazil the principal agent for the transfer of energy technology to the underdeveloped and developing countries.

The two ministers also agreed to a visit to Germany by two Brazilian technical missions that are going to study the expansion of bilateral cooperation in the energy sector. The first mission will be concerned with the area of utilization of nonrenewable sources, with special interest on the part of the Germans in intensifying cooperation in the coal mining and processing sector. In addition, the German Government expressed interest in participating in the shale exploitation project in Maranhao. The task of the second mission will be the utilization of renewable sources, especially wind and solar energy and hydrogen.

The sector dealing with the utilization of renewable sources is of special importance since it constitutes the nucleus of the program for the transfer of energy technology.

Nuclear Agreement

Cesar Cals declared that in all of his contacts in Germany thus far, the nuclear agreement has been the subject of conversation, although normally specific points were not dealt with. In the visit made yesterday by the mines and energy minister to the headquarters of Siemens in Munich, one of the points of the agreement was especially dealth with, namely, uranium enrichment technology. Siemens is the executor of the centrifugal jet process and they explained the operation of the technology in detail to the minister.

"Siemens guaranteed us that the technology has been mastered," said Cals.

The German is going to install a factory in Curitiba for the production of components for the isotopic separation plant.

The day before yesterday, the mines and energy minister also visited the Grafenrheinfeld nuclear plant, which is the reference model for the Angra-2 and Angra-3 reactors and for the two at Iguape. The Grafenrheinfeld plant is currently operating at 100 percent load and left a positive impression on Minister Cals: "The project is good. It appeared to me to be very advanced compared to other nuclear plants I have already seen."

Today, Cesar Cals will visit the Plasma Physics Center of the Max Planck Institute in Munich. On Monday, his schedule includes a visit to a coal gasification plant in Bottrop and contacts with German businessmen in the coal sector, in Bonn. On the last day of the official visit, on Tuesday, Cals will meet with Economics Minister Otto Lambsdorff, with whom he will have lunch. In the afternoon, the mines and energy minister will attend the signing of a contract between the Aerospace Technical Center (CTA) and the German DFVLR Agency. Later, he will be received by the president of the republic, Karl Carstens.

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CSO: 5100/2154

BRIEFS

FIRST YELLOW CAKE PLANT--Pocos, de Caldas, Brazil, 6 May (AFP)--President Joao Figueiredo today dedicated Brazil's first industrial plant for the production of uranium concentrate (yellow cake). This plant has a production growth of 500 tons per year. The basic project was drawn by the French company Societe du Cycle de l'Uranium Pechiney Ugine Khulman, and the plant cosntruction cost $240 million. The uranium concentrate (yellow cake) produced in Pocos de Caldas will be enriched by URENCO [a British-Netherland-FRG uranium enrichment consortium], and they it will be utilized in the nuclear plants which are being built in Brazil under provisions of the agreement signed with the FRG on 27 June 1975. [Text] [PY081008 Paris AFP in Spanish 0025 GMT 7 May 82]

CSO: 5100/2171

BRIEFS

ARGENTINE BOMB ABILITY VIEWED--Lima, 6 May (AFP)--Argentina can make its own nuclear bomb and has every right to do so to guarantee its survival, Gen Juan Barreda, chairman of the Peruvian Nuclear Energy Institute, has stated here. On announcing an international bid for exploration for uranium deposits in Peru, General Barreda said: There is nothing unusual in that Argentina can have its nuclear bomb, just like the United States can. He said Argentina has four uranium deposits which are now being exploited and thus it has the raw material needed to make the nuclear bomb. In conclusion he said that the Malvinas conflict had not affected the Peruvian-Argentine agreements on nuclear cooperation in peaceful research, and that a few days ago he had received the appropriate amount of money. [Text] [PY081027 Paris AFP in Spanish 1651 GMT 6 May 82]

CSO: 5100/2170

'BREAKTHROUGH' MADE IN NUCLEAR REACTOR TALKS

TA090751 Jerusalem THE JERUSALEM POST in English 9 May 82 p 1

[Report by Charles Hoffman]

[Text] A "breakthrough" has been achieved in attempts to initiate discussions with several countries on buying a nuclear reactor to generate electricity, according to Energy Minister Yitzhaq Berman.

Berman told THE JERUSALEM POST that after several years of efforts to get discussions started, several countries are now willing to search for a formula that may permit Israel to acquire a reactor.

He would not identify the countries with which Israel has been in contact, but said in response to previous reports that the most progress has not necessarily been made with France. The countries usually mentioned as potential sources of reactors are the United States, Canada, Belgium, France and Britain. Berman recently made several trips to Britain, where he discussed matters of coal, oil and nuclear power.

Berman said that in the past the main obstacle to acquiring a reactor was the unwillingness of foreign governments even to consider the idea until Israel had signed the nuclear non-proliferation treaty. The companies that manufacture the reactors, however, have always been eager to sell, he said.

Israel does not want inspection at its Dimona and Nahal Soreq nuclear reactors.

He said there has now been progress in negotiations between the companies and their governments aimed at finding a formula by which sales could be made to Israel without the latter signing the treaty. Western governments have come under increasing pressure lately from unions to do whatever they can to relieve growing unemployment.

The Westinghouse Corporation planned to sell Israel two reactors in 1977, but the deal was cancelled as part of the Carter administration's restrictions on the export of nuclear technology. Since President Ronald Reagan took office, observers have predicted that he would ease the curbs as they applied to Israel.

CSO: 5100/4721

BRIEFS

RSA NUCLEAR DEVELOPMENT--The Federal Government says it is in support of the efforts of the International Atomic Energy Agency, IAEA, to promote safety in nuclear energy development. President Shehu Shagari gave the assurance when the director general of the agency, (Dr Hans Blecht), paid him a courtesy call at the State House in Lagos. The president deplored the role of some Western countries in aiding the development of nuclear energy by the racist regime in South Africa, adding that the situation now poses a threat to Africa. President Shagari said that Nigeria was not in a hurry to sign the nuclear energy. He stressed that Nigeria could not sign the agreement now because nothing had been developed. Earlier (Dr Blecht) commended Nigeria for promoting disarmament and for signing the Non-proliferation Treaty. [Text] [AB181146 Lagos Domestic Service in English 0600 GMT 18 May 82]

CSO: 5100/2170

BRIEFS

NUCLEAR POWER STATION--The first South African nuclear power station, the Koeberg station near Cape Town, will begin generating power in the first half of next year. The South African minister of mineral and energy affairs, Mr F. W. de Klerk, says the delay in commissioning the station follows problems in acquiring nuclear fuel, but other sources have been found. He says it is to be expected that there would be minor delays in the commissioning of the first nuclear power station to be built on the African Continent. Mr de Klerk also says that South Africa is giving constant attention to the possibility of signing the Nuclear Nonproliferation Treaty. He says discussions regarding the matter are taking place but he is not prepared to provide more information. With regard to the synthetic production of fuel, Mr de Klerk says South Africa will have to decide soon on whether to build another plant on the lines of the existing oil from coal plants. [Text] [LD111152 Johannesburg International Service in English 0630 GMT 11 May 82]

KOEBERG OPERATIONAL IN 1983--The Koeberg nuclear power plant will be fully operational in the first half of the coming year, according to Minister of Mineral and Energy Affairs, F. W. de Klerk. During a discussion of his budget, de Klerk said that it should be remembered that Koeberg is South Africa's first nuclear power plant. Therefore delays and problems are to be expected. Still, the delays and problems that have surfaced so far are not considered unusual. The Electricity Supply Commission (ESCOM) has obtained fuel for the nuclear power plant from a different source than was originally planned. But delivery of the fuel was held up somewhat. That entailed some delays, but ESCOM is exerting itself to preclude any more delays. [Text] [Capetown DIE BURGER in Afrikaans 14 May 82 p 23]

CSO: 5100/5653

ALLOCATIONS, PROGRAMS, GOALS OF 1982 AEC BUDGET OUTLINED

Paris CEA NOTES D'INFORMATION in French Dec 81 pp 14-20

[Article: "The AEC Budget for 1982"]

[Text] The 1982 AEC [Atomic Energy Commission] budget will total Fr 13.4 billion. Its overall growth will be 18 percent in comparison to total 1981 allocations. This rate may seem satisfactory, but it nevertheless masks some highly contrasting situations: a difficult military budget, a generally better funded civilian budget, but also a very sharp imbalance between the programs of the Interministerial Research Package--increased subsidy of 24.1 percent--and the Technological Development Programs--increased subsidy of 14.6 percent.

A relative decline in "unscheduled" expenses (financial expenses, cost overrun of Superphenix, tax expenses, etc.) has made possible larger increases in resources for the programs alone, but certain sectors will not escape a certain shrinkage of their actual resources.

The main features of this budget are: On one hand, priority given to employment, with the creation of new positions in both the civilian and military sectors, reduction of the work week and the incorporation of a significant number of outside enterprises and personnel outside of labor agreements; on the other, a very vigorous investment policy, simultaneously aimed at launching major new operations (including TORE-SUPRA) and at modernizing the basic equipment of certain laboratories.

With regard to programs, the 1982 budget means the adaptation of research and development operations to government priorities: Particular emphasis will be placed on new areas of national technological development (biotechnology, electronics, robotics, food and agriculture, energy conservation, new energy sources) and on the coherence to be established among the whole public sector's operations.

In areas of research other than industrial innovation and valorization, in 1982 the AEC will give priority to basic research, particularly the controlled fusion sector, while maintaining priority for nuclear power, nuclear safety, reprocessing of irradiated fuels and radioactive waste storage and processing programs.

The 1982 budget appears to be a transition budget for the AEC. On one hand, the general guidelines of its nuclear power programs have been retained, with several major areas of interest: supply of uranium for France, development

of new enrichment processes, nuclear safety, reprocessing of irradiated fuels, processing and storage of radioactive wastes. On the other hand, there is a clear development of intermediate-range guidelines, according to which the commission will be led to adopt new research goals in accordance with the priorities of public authorities: This is true in the case of robotics, biotechnology, electronics, food and agriculture, energy conservation, new energy sources, etc.

In budgetary terms, the simultaneous emphasis on basic research and these new developments will mean a very great increase in the establishment's investments, which will total more than Fr 2 billion, for the combined civilian and military sectors. Of course, such a situation reflects choices which are often difficult and the stringency of certain decisions is much more perceptible in the areas of nuclear energy applications and military applications.

Thus before going on to a more complete analysis of jobs and resources, the most difficult situations and most significant investments must first be noted.

Both have their place in a budget which is also characterized by a new dimension of social problems.

Social Aspect

The social aspect of the budget concerns five major areas.

First, by participating in the national research effort in both the basic research sector and the new technological areas of interest, the AEC will increase its staff by creating 100 new research positions. A supply of skilled labor will also be granted to the Military Applications Division [DAM], which will create 120 new jobs in 1980 [as published], warranted in particular by the production program for the M4 system.

Second, to comply with the national goal of combating unemployment, as of 1 January 1982 the AEC will reduce the work week to 39 hours for personnel on normal schedules and to 38 hours for teams subject to continuous service. Although the impact of this measure is difficult to measure a priori, in terms of jobs, in this connection the 1982 budget provides for the creation of 100 additional jobs.

Third, the AEC intends to combat the rapid and natural trend toward retirement, resulting today from the massive recruitments of the 1960's. The solution under consideration is the early replacement of personnel reaching the age limit, a significant increase in their number being expected after 1985. Although the creation of about 100 new jobs for 1982 is intended, in particular, to make it possible to handle and complete certain prior hiring and reclassification operations, this method should also involve 200 additional recruitments for 1983, 1984 and 1985 each, as the AEC has already proposed in connection with preparing the research guidelines and programming bill.

Fourth, the decision has been made to negotiate with trade unions the matter of hiring personnel outside of labor agreements. Based on a conflicting assessment of situations in which outside labor was closely mixed in with the establishment's personnel--but without being subject to the same regulations--as a proposed

frame of reference, the 1982 budget has scheduled the hiring of 3,000 persons, staggered throughout the year.

Fifth and finally, in 1982 the commission will exercise solidarity within the group to come to the aid of affiliates which would be facing problems of converting their labor. The main reclassification operation will concern the SFEC (Catalytic Components Production Company), which is experiencing a sudden decline in operations, related to completion of the Tricastin enrichment plant. For this company's employees, the AEC will reserve a percentage of positions in scientific plants of the civilian and military sectors.

The scope of the new employment policy, which constitutes one of the principal features of the 1982 budget, can thus be evaluated. To complete this quick survey, it should be added that some of the commission's operational plants will be making a considerable effort to convert and reclassify their employees in order to cope with the development of their programs. In this regard, we will mention in particular the effect of program decisions with regard to isotope separation, which will be carried out at the expense of gaseous diffusion and to the benefit of advanced uranium enrichment processes (lasers, cyclotron resonance) and the chemical exchange process.

Budgetary Limitations

The mention of such problems naturally leads to mentioning the main budgetary limitations for 1982. Such difficulties will be related either to the dynamics of certain programs and the inadequacy of allocated funds to implement them or quite simply to strained situations, necessarily leading to certain operational reductions.

The first case includes the industrial innovation and valorization sector, which, quite paradoxically, is enjoying an apparently spectacular growth rate (+39 percent) for its resources and will experience unprecedented problems in 1982, since it must simultaneously provide for the development of radioelements and the paranuclear sector, initiate the rapid development of new areas of interest such as robotics, the food industry and biotechnologies, and support LETI's [Data Processing Technology and Electronics Laboratory] new microelectronics program to a significant degree. If it wants to safeguard the coherence of its programs in this area, the AEC will undoubtedly be obliged to financially dissociate itself from the EFCIS [Study and Manufacture of Special Integrated Circuits], now totally included in the new public sector.

Another example, already mentioned, is that of isotope separation: one of the commission's major planned investments, the industrial pilot plant for demonstrating chemical processes, whose importance is vital for the future, will probably not be able to be financed beyond engineering studies this year.

In the second case, that of sectors which will not be able to be developed in 1982, we will mention the programs concerned with electric-power reactors on one hand and on the other, the programs for the design, production and testing of nuclear weapons.

With regard to reactors, a reduction of actual subsidy resources is obliging the AEC to make choices at the expense of studies on fast-neutron reactors in order to maintain a reasonable level of research, development and aid to operators of the PWR [pressurized-water reactor] system. AEC action will concentrate on supporting the construction of Superphenix in the case of breeder reactors, with studies on continuing the system being considerably reduced.

The military sector's growth rate is limited to 16.8 percent, which is the lowest figure recorded in several years. Thus the establishment of essential new resources, in the case of both nuclear testing and the production of weapons on order, is obliging the DAM to reschedule the accomplishment of other goals.

Financial difficulties are also currently affecting the enriched-uranium production sector. Due to the divergent development of uranium and electricity prices, these difficulties exacted a heavy toll on COGEMA [General Nuclear Materials Company] in 1981. They could become worse in 1982 and following years in the absence of any revision of current financial conditions.

A Budget Resolutely Oriented Toward the Future

Although it does not eliminate some important areas of concern, the 1982 budget will nevertheless be resolutely oriented toward the future as a result of investment. For the voluntarism of 1982's budget choices also reflects this very clearly. To characterize this effort, we will point out four major equipment programs, while mentioning the scope of the contribution which they represent for the economies of the regions where they will be implemented.

The first of these is TORE-SUPRA, Tokomak Superconductor of Cadarache.* In launching its construction, the AEC has agreed to a 5-year investment of Fr 555 million (under economic conditions of 1 January 1981), which will benefit the Provence-Cote d'Azur region, since its installation will be followed in 1986 by that of a laboratory with more than 350 physicists, engineers and technicians and an annual operating budget of approximately Fr 200 million, whose regional scientific influence will be particularly substantial.

Second, there is LETI's investment program in the area of microelectronics, which now represents one of the most promising areas of the commission's paranuclear operations. This program, which is intended to provide the resources essential for implementing a new "Post-VLSI" microelectronics plan (1981-1986),** could account for up to an annual expenditures level of approximately Fr 100 million in 1982 and in each year from 1983 to 1986. Beyond financial difficulties, which are currently not resolved, resulting from the scope of this plan, its continuation will greatly affect the future of the Grenoble Nuclear Studies Center.

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*In the area of controlled fusion, the TORE-SUPRA program is aimed, on one hand, at acquiring significant experience in using superconductor technology and, on the other, at studying current problems of confining and heating plasmas.

**This plan is part of the extension of LETI's studies, in connection with the Integrated Circuits Plan, on MOS technologies and high integration levels (VLSI).

The third investment to begin in 1982 is the pilot plant for uranium isotope separation by chemical means. As we have seen, the project's budget allocations have not reached the level required by the AEC's bills-payable book, of course, but the initial stimulus has been provided for a project whose total package is Fr 500 million, in 1982 value. This is an extremely important decision both technologically and politically: giving international commercial credibility to the nonproliferant Chemex process developed by the AEC by demonstrating its industrial and economic feasibility with a pilot installation. Even more is at stake, since this technology has proved well suited to the future needs of developing countries which would choose nuclear energy, for it should be particularly competitive in the case of low-capacity installations.

The choice of Pierrelatte for the installation of the pilot plant is also of the utmost importance for the future of this site and the region, since in the intermediate term it can help to solve the very acute reconversion problems currently being experienced by this area, whose human potential must be protected.

Finally, among the most significant trends of 1982, we will mention the highly sustained investment activity in the case of reprocessing, with continuation of the pilot installation for reprocessing fuels of the rapid TOR system, whose construction was started in 1979 and which will go into operation in 1984. The TOR investment will total Fr 120 million in 1982, including experimental units.

This investment concerns the Marcoule Center, whose mission, with regard to reprocessing, will be even better assured for the future with the start, in 1982, of the so-called Atalante operation for the transfer and modernization of the installations for plutonium studies, currently located at Fontenay-aux-Roses. This decentralization is also a very broad program, since it will extend over the entire decade and all planned allocations between now and 1985, in the basic documents which will be used to prepare the research appropriations act, represent approximately Fr 260 million in 1981 francs (HT [excluding taxes]).

Initially, it was important to note the most salient features of the 1982 budget choices, whether they were the most dynamic or the most worrisome.

Now we will analytically detail the major parts of this budget, in terms of resources on one hand and in terms of jobs on the other, while describing the content of the main program policies.

Financing

The commission's budgetary resources will total Fr 13.429 million in 1982, which represents an 18-percent increase over the 1981 budget. In view of the current 13.2-percent hypothetical average fluctuation of prices, considered by the government in the 1982 economic budget, in constant monetary terms this budget's growth is therefore 4.2 percent.

In making an analysis, however, it is important to distinguish between the civilian budget and the military budget, which respectively represent 51 and 49 percent of the total financing. In 1982, the civilian budget's growth will be greater, since with an overall increase of 19.2 percent, it will surpass that of the military budget (+16.8 percent) by 2.5 percent.

The difference in rates appears smaller, however, if we restrict ourselves to the expected increase in subsidies, from the Ministry of Research and from the Ministry of Defense: 17.8 as opposed to 16.8 percent.

This itself shows the relative size of the AEC's own resources within the civilian budget, of which they will represent 23 percent in 1982. The growth rate of these direct proceeds will be 23.6 percent, which assures civilian resources of substantial additional support and at the same time provides many units with useful management flexibility.

Each of these three resource categories should be described.

1. The civilian subsidy has been fixed at Fr 5.2618 billion, which are divided into two subdivisions of unequal size in the government budget: the portion allocated for the Interministerial Research Package (EIR): Fr 1.8662 billion, up 24.1 percent; the portion allocated to Technological Development Programs (PDT): Fr 3.3956 billion, an increase of not more than 14.6 percent.

This distinction shows the sharp funding gap between basic research programs and industrial innovation and valorization, on one hand, which benefit directly from the boost provided by public authorities for the research budget and, on the other, the missions directly related to the nuclear power program, on which the effect of the new research policy is less perceptible.

The contrast is somewhat less pronounced, however, inasmuch as the amount of unscheduled expenses, much more of a burden for the PDT than the EIR, is reduced substantially in 1982, particularly as a result of curbing the "Superphenix cost overrun."

Thus in the final analysis, we should compare the development of the subsidies granted by the Ministry of Research and Technology to each program group, while considering unscheduled expenses separately:

	1981	1982	Variation
Subsidy for EIR Programs	1.2488	1.6272	+26.7%
Subsidy for PDT Programs	2.1426	2.5338	+18.3%
Unscheduled Subsidy	1.0388	1.1008	+ 6.0%
Total Civilian Subsidy	4.4663	5.2618	+17.8%

(AP [Program Authorizations] + DO [expansion unknown] in billions of francs)

2. Funds transferred from the defense budget will total Fr 6.538 billion in 1982, or an increase of 16.8 percent.

At this point we will compare the allocations of sections of the joint portion of the defense budget, which have risen from Fr 5.433 billion to 6.302 billion overall and have consequently increased 16 percent, and those of section 53-71 of the "Navy" portion, whose absolute value is much smaller (Fr 236 million in 1982) but which have risen 43.6 percent.

The former provide for the financing of weapons studies and production, including the production of their required nuclear materials and technological nuclear-propulsion studies. The latter cover the production expenses of nuclear boilers ordered by the National Navy: missile-launching nuclear submarines, attack submarines and surface vessels.

3. Finally, with regard to direct proceeds, whose overall growth will be greatest (+23.6 percent), as we have seen, they will total Fr 1.6291 billion in 1982, with 97 percent (Fr 1.5803 billion) for civilian operations and 3 percent for military operations.

An analysis of this category shows that, apart from the expected proceeds, in 1982, of patent rights fees (Fr 125 million) and other proceeds (Fr 64 million), the Fr 1.580 billion in civilian direct proceeds are divided into three categories of equivalent size.

First, we will mention revenues actually related to turnover. They represent Fr 478 million and correspond to energy production and sales (Fr 241 million) and sales of stable isotopes and radioelements (Fr 237 million). Their overall growth is approximately 20 percent.

Second, we should note the financial counterparts of services rendered (Fr 494 million), whose largest item (Fr 121 million) is that of fees paid by operators of nuclear installations, partly returned by the Ministry of Industry to the AEC as expenditures for analysis and supervision which the commission carries out for public authorities.

Otherwise, the "services rendered," which are generally not billed for more than their cost price, are comprised of industrial hygiene benefits and safety and protection assistance provided by the AEC's Department of Protection, EDF [French Electric Power Company] coverage for inspections of operating PWR reactors, which the AEC provides as a result of having developed in-service inspection machines (MIS) and pipe-inspection machinery (MIT), making labor available to outside agencies, and general or technical support fees billed to companies with installations at nuclear studies centers.

"Counterparts of services rendered" will increase nearly 26 percent from 1981 to 1982, due mainly to the planned increase in fees from safety analyses, made possible by the 40-percent increase in the schedule of fees, in accordance with the financial appropriations bill for 1982.

Third and last, Fr 419 million in direct proceeds will be provided in 1982 by the contributions of outside agencies to joint scientific programs; such contributions are most often provided through a 50/50 partnership framework. In the case of the most significant items, for example, there are the EDF's contributions to reactor safety programs or for operation of the Cadarache advanced-prototype boiler, where the AEC conducts endurance tests on fuel assemblies, and the participation of public authorities in the "Nodules" project (Ministry of Industry), the electronics programs of the AEC (DILLI [Department of Data Processing and Electronics Industries of the Ministry of Industry]), DAII [Department of Industrial and International Affairs], CNET [National Center for Telecommunications Studies of the Ministry of Posts and Telecommunications],

DGRST [General Delegation for Scientific and Technical Research], DRET [Directorate of Technical Studies and Research of the General Delegation for Weapons], as well as the participation of the IN2P3 [National Nuclear Physics and Particle Physics Institute], (CNRS [National Center for Scientific Research]), in operating the "Saturne" particles accelerator.

But particularly in 1982, there will also be Euratom's contribution to the French controlled-fusion program and to the construction of TORE-SUPRA, whose operation was made possible through preferential financial support (45 percent of machinery costs) from the European Economic Communities.

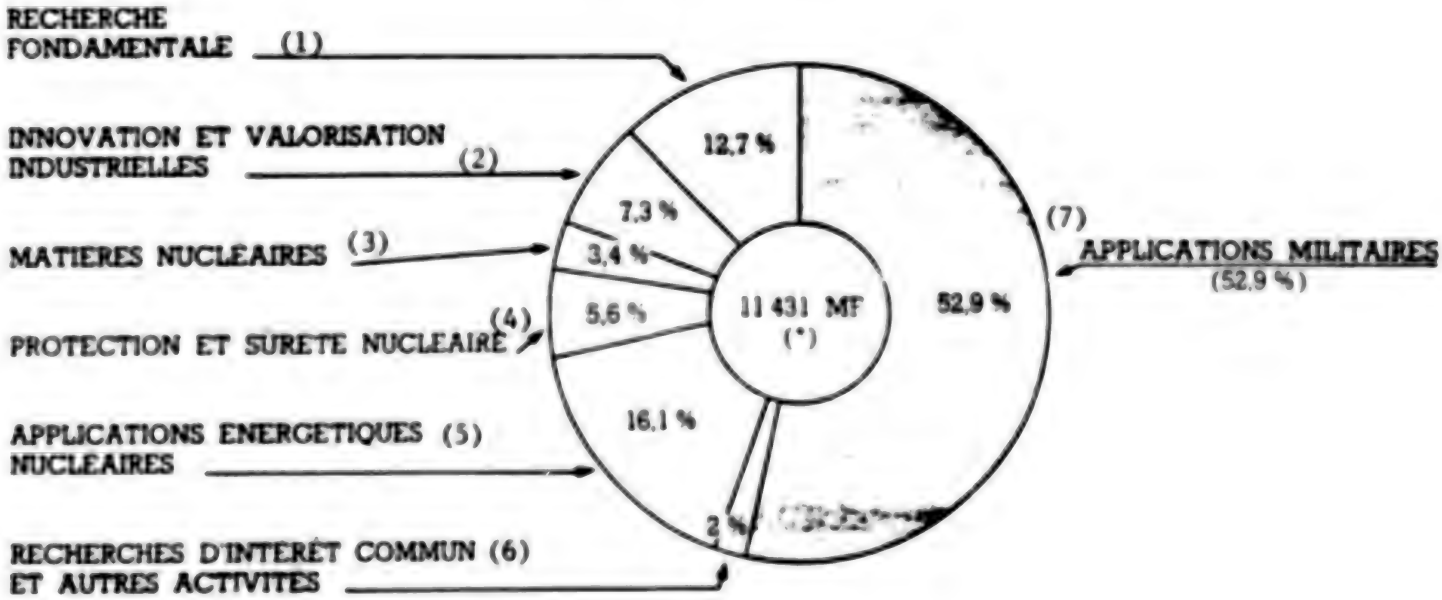
Due to this latter financing in particular, all "outside contributions" have increased nearly 45 percent overall.

On the whole, we note the strong dynamics of "direct proceeds" among total resources while underscoring the relationship which exists between the subsidy level of the establishment and this "revenue effect." The overall growth of operations caused by the effort provided by the state budget puts into play a multiplier phenomenon in the case of the establishment's own revenues.

The Programs

With regard to jobs in the 1982 budget, we will analyze the commission's scientific operations on the basis of its current division into six major civilian missions and one military mission, whose respective sizes are illustrated by the following diagram:

1982 AEC Programs



(*) The gap between this figure and the total of the 1982 budget (Fr 13.429 billion) corresponds to the amount of unscheduled expenses such as financial expenses, tax fees, early retirements, nuclear safety expenditures, Superphenix cost overrun. It also explains the 52.9 percent of military applications in the programs, whereas this is only 49 percent in the budget.

Key:

1. Basic Research
2. Industrial Innovation and Valorization
3. Nuclear Materials
4. Nuclear Safety and Protection
5. Nuclear Energy Applications
6. Research of Common Interest and Other Activities
7. Military Applications

The EIR programs, which have generally been given budget priority in 1982, are those of the basic research (RF) mission and the industrial innovation and valorization (IVI) mission.

Such priority means an increase, of 27.2 percent overall, in specific financing for the two missions. The basic research budget is particularly oriented toward investment in 1982. The controlled-fusion sector is the most representative in this regard, with the launching of the TORE-SUPRA operation and initial funding of Fr 147 million. The AEC will also have to meet calls for funds to cover the French association's participation in the construction of JET (Joint European Torus), underway at Culham (Great Britain).

Paralleling this controlled-fusion effort, the budget of the Institute for Basic Research [IRF] will continue to finance a very extensive program for major scientific plants, including mainly:

Final construction of the National Large Heavy-Ions Accelerator (GANIL) at Caen, as well as the testing and adjustments required for its operation for the benefit of researchers in 1983;

The AEC contribution to the operation of the Laue-Langevin Institute (ILL), a part of which is to be used for "second-wind" financing of the high-flux reactor at Grenoble; this modernization operation will continue to 1985 and will enable the ILL to retain its world lead in neutron spectroscopy beyond 1990;

The installation, in progress at the Saturne National Laboratory, whose field of research is complementary to that of GANIL, of the third large very-high-angular-resolution spectrometer, which will open a vast field of research extending over a whole decade;

Modernization of the Van de Graaff Tandem accelerator, which, by means of superconductor cavities constructed with the participation of the DAM, will make it possible, on one hand, to prepare for training teams and developing equipment to be installed for GANIL and, on the other, to continue current research.

But in addition to this group of major investments, in 1982 the IRF will launch a program of studies focusing on solar biotechnology in cooperation with the CNRS and, with financial aid from the Solar Energy Commission, will begin

construction of the corresponding laboratory at Cadarache. The program will have a dual focus, studying the direct bioconversion of solar energy by photosynthesis on one hand, and on the other, the conversion of biomass, with priority being given to the study of bioproductive systems for hydrogen and methane. While maintaining its level of activity in all other sectors of basic research, in 1982 the IRF will also start restandardizing the material and human resources of its laboratories, giving preference to developing so-called "light" research such as biology, theoretical physics, condensed-state physics, atomic physics, astrophysics and geophysics.

The 1982 AEC budget will have its greatest growth in the industrial innovation and valorization sector, with a 39-percent rate of increase.

If this mission maintains its triple goal in 1982 of supporting an applied research effort outside the nuclear sector, of transferring AEC technology and experience to French industry and direct valorization of know-how acquired by the commission's teams, its new programs and resources will make it possible to begin establishing areas of technological development in robotics, food and agriculture, and biotechnologies, whose importance is bound to increase substantially in coming years.

Priority for Nuclear Safety and Protection

The group of programs comprising the nuclear materials missions, nuclear safety and protection, nuclear energy applications and research of common interest and other operations has also been assured of an overall growth of 18.8 percent.

With regard to research of common interest, whose goal is to provide for the maintenance and modernization of installations of general interest at nuclear studies centers, we will limit ourselves to saying that such financing is scheduled to be increased by 19.3 percent to provide a level of safety, maintenance, radiological protection and processing of radioactive wastes and effluents in keeping with the general development of scientific operations peculiar to each establishment.

With regard to the other three missions, the 1982 budget appears quite varied.

The resources of the "nuclear materials" mission will be increased substantially (+26.1 percent), which does not reflect the difficult decisions which had to be made in this area and which were described above with regard to isotope separation. The small relative amount of the mission's funds and the multiplicity of its priorities (advanced procedures, chemical processes) explain this paradox.

However, and despite the problems encountered, on an industrial level the commission will give full priority to fulfilling its licensing obligations to EURODIF [European Diffusion Agency], whose full operation will take place, as scheduled, in late 1982. The AEC will thus be obliged to provide the means for solving the technical problems which generally accompany the initial operation of industrial complexes of this size; expertise and measurement operations will be conducted to learn as much as possible about the installations' operation.

The AEC will also actively continue its research concerning natural uranium to assure France of the renewal of its ore resources and to improve its supply security. The programs will therefore be focused on finding resources whose technical availability is gradually declining, on renewing or optimizing exploration techniques and on uranium recovery and extraction processes.

The "nuclear safety and protection" mission's budget will undergo an overall change of 18.5 percent, which, without increasing it substantially, confirms the priority which has been given to its programs for several years.

Two major functions are confirmed among AEC safety programs: technical support for government safety authorities and a very broad research and development program concerning the safety of the entire fuel cycle and nuclear reactors.

The first function, which has the nature of a public service mission, includes very specifically: analysis of the safety records of all French basic nuclear installations; technical monitoring, from the standpoint of safety, of these installations' operation; and quite recently, national control of nuclear materials, as established by the law of July 1980 and its implementing regulations of May 1981.

In 1982, all of these technical support operations for the Ministry of Industry will have their resources increased by 25 percent, with 100-percent coverage, for the first time, of expenses by direct proceeds from fees paid by operators of basic nuclear installations.

The second major function of research and development safety operations focuses on several programs of national interest: the protection of mankind and the environment, an area in which the AEC will continue in 1982 to implement a very broad program, includes the preparation of radioprotection standards on the international level, on one hand, and on the other expertise operations related to safety permits (effluent waste permits, formulation of special intervention plans in the event of accident); applied research and development regarding reactor safety.

In the case of water reactors, the AEC will simultaneously provide for the gradual establishment of operating conditions defined in the light of what has been learned from the accident which occurred in the American reactor at Harrisburg, since an analysis of malfunctions shows that they may be early signs of accidents, which itself would lead to corrective measures, and finally, for improved knowledge concerning the behavior of nuclear installations and their components in accident situations, making it possible to validate computer systems, and concerning the man-machine interface. With regard to fast-neutron reactors, current programs will be actively continued: studies of the long-term behavior of materials used for internal structures subject to high temperature, studies of the means of inspecting a reactor vessel in service and accident studies. In this latter case, putting the ESMERALDA installation at Cadarache into service constitutes a major goal for the study of large sodium fires.

Finally, we will point out the studies on the safety of fuel-cycle installations, an area in which the AEC should reach a particularly satisfactory level of knowledge in 1982 in critical studies; the control of sensitive materials, which will

be subject to a sharp increase in the means employed; and finally, the efforts which will be made in the current priority sector of radioactive wastes, in which the AEC is striving to improve its knowledge of the long-term behavior of storage barriers, to define specific safety criteria and to evaluate the safety of permanent storage, either on the surface or in deep geological formations.

Finally, the 1982 budget provides for an overall growth rate of 18.3 percent for the "nuclear energy applications" mission, which alone represents nearly 35 percent of all civilian financing.

Among its programs, two main sectors can be distinguished: studies devoted to reactors, as well as to fuel production, and those concerned with other stages of the fuel cycle down the line.

The first sector has a budget of Fr 1.248 billion, up 18.1 percent. The second sector, which simultaneously is concerned with fuel transport and reprocessing and waste processing and conditioning at the end of the cycle, will have its resources raised to Fr 587 million, or an increase of 18.8 percent.

The major features of these budgets are as follows:

a) In the case of ordinary-water reactors: support for the EDF in developing computer systems, monitoring the activity of primary circuits, neutron physics experiments, development of methods for nondestructive monitoring of reactor vessels; maintenance of an extensive program for water-reactor fuels, in particular, in cooperation with FRAGEMA*, to develop fuels whose performance will be superior to that of current fuels; continuation of important programs for the study of components, particularly steam generators, and for reducing the irradiation of personnel--a number of studies undertaken under the quadripartite program, whose present form will end in November 1982, have been continued in a strictly French context with EDF and FRAMATOME [Franco-American Atomic Construction Company]--whereas new programs for the design of a 4,250 MWth nuclear boiler will be launched with the national builder (N4 project).

b) With regard to reprocessing and wastes: support, through an extensive research and development effort, for construction in The Hague of plants which will gradually be put into service starting in 1986 and which will make it possible to have, by 1988, reprocessing capabilities for ordinary-water reactor fuels of 1,600 tons/year, to be used for both domestic needs and the satisfaction of foreign contracts; paralleling this, the continuation of preliminary studies for designing a prototype plant for reprocessing fast-neutron reactor fuels; a greater research and development effort for the processing, conditioning and storage of radioactive wastes.

c) With regard to fast-neutron reactors: technical support for Superphenix construction and establishment of data-gathering structures at the time of starting tests; determination, in cooperation with EDF and NOVATOME [expansion unknown], of characteristics of reactors which will succeed Superphenix.

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*FRAGEMA: A company established in 1981 jointly by FRAMATOME and COGEMA for the design and marketing of water-reactor fuels.

Finally, the commission will continue the preliminary studies related to the THERMOS [expansion unknown] project for demonstrating urban heating by means of a special nuclear reactor, with a view to its possible construction at the Saclay site.

Military Programs

Before concluding this examination of the 1982 budget, we will provide a quick survey of its military programs.

Allocations of the "military applications" mission in 1982 will be increased by 17.1 percent over 1981, which does not make it possible to prevent certain programs from extending into 1983 and future years.

Excluding the "diversification for the benefit of Defense" program, which corresponds to various studies (resistance to electromagnetic effects, vector resistance, sale of irradiation and various tests) conducted by the DAM and financed exclusively by direct proceeds, the military applications budget is comprised of three subdivisions:

Programs for the design, production and testing of weapons. As part of the "ordered weapons" programs, the effort will continue in the case of the M4 and ASMP (medium-range air-to-surface [missile]) weapon systems, which will become operational in 1985. The M4 system, acquired in late 1979, has required significant resources, particularly at the experimental level. The "future weapons" program has two goals: future strategic weapons and future tactical weapons, destined to replace current weapons during the next decade.

Allocations for the "improvement of basic knowledge" permit the commitment of a significant amount for the Phebus project at Limeil, which is a high-power laser for pursuing dense-plasma studies and improving the DAM's knowledge of physical phenomena occurring during the operation of weapons.

A specific "nuclear materials" budget, whose allocations have increased slightly under the terms of current agreements with the Ministry of Defense.

Finally, the nuclear propulsion programs and the naval program. The "naval program" will be greatly expanded, whereas the "nuclear propulsion studies" goal will grow only slightly. This is explained by the operation of the CAP (Advanced Prototype Boiler) at Cadarache, which will be entirely under the civilian sector's control in 1982, whereas it was only partially so in 1981. Other activities related to this goal correspond to PAT (Ground Prototype A) studies and maintenance, which will be greatly streamlined.

Concluding this survey of 1982 budgetary perspectives, we will note this budget's signs of encouragement for the future.

In beginning this survey of the 1982 budget, we said that it bears the mark of a transition.

The significance of the studies conducted by the commission and its scientific potential and achievement prove that, in a general context which is very

favorable for all French research, the sense of this transition is to provide the establishment's programs and resources with new growth.

The increase in its funding within the Interministerial Research Package, the creation of new jobs which have been approved for the EIR and the launching of major new scientific installations must be interpreted as signs of such a development.

We believe that the voluntarism of the internal decisions, by which the establishment has itself striven to protect the future of its programs at the cost of sometimes painful choices, will be met by their necessary intermediate-term developments and on which the next research orientation and appropriations bill should confer official impact.

11915
CSO: 5100/2117

PROGRAM STRESSES BREEDER REACTOR, URANIUM ENRICHMENT PROCESS

Paris INDUSTRIES ET TECHNIQUES in French 10 Mar 82 p 79

[Report by Jacques Houbart on presentation given by Jules Horowitz and Georges Vendryes, both of the AEC, at colloquium on high technology, 17-18 March 1982]

[Excerpt] If high technology is defined less by sophistication than by the importance of its fallout and the fertilization of the industrial soils, the nuclear case is particularly exemplary. It is not the least among the good points in the report prepared by Jules Horowitz, director of the Basic Research Institute of the CEA [French Atomic Energy Commission], and George Vendryes, director of nuclear applications for CEA, that it forcefully recalls this truth, which has been concealed too long and too often. They did succeed in their intention to unveil the atom without disguise. Today, French industry holds a leading position in the decisive stages of the electric-nuclear cycle: uranium enrichment, perfection of a line of breeder reactors of the Superphenix type, and construction of the only operational unit--on the industrial level--for the reprocessing of irradiated fuels from power plants. It was possible to achieve this technological breakthrough as part of a major nuclear electric power program with whose help, starting in 1981, 1 kwh of every 3 kwh produced by EDF [French Electric Power Company] was of nuclear origin; the target for 1985, that is, 1 kwh of every 2 kwh, should be reached somewhat ahead of schedule. Various lobbies are working hard in a last-ditch attempt to obstruct the development of atoms for peaceful uses. They intend to block the development of breeder reactors and the reprocessing plant at La Hague; as emphasized by Jean Rastoin, chief of the Mechanical and Heat Studies Department of CEA: "This is an integrated process whose phases are coordinated. The reprocessing plant not only eliminates waste coming from power plants in operation but also provides fuel for the power plants that are equipped with breeders." According to Achille Farrari, the breeder line--of which France is the chief promoter, although the USSR and the United States are also working in this field--"makes it possible to use all of the uranium contained in the mineral, thus multiplying the quantity of energy that can be gotten out of one and the same quantity of uranium by 70-80. In these reactors, French uranium reserves become the energy equivalent of the petroleum reserves of the Middle East!" The year 1984--the date of connection to the Superphenix at Creys-Malville--will thus be a key date, the date of a complete nuclear electric power cycle.

While the breeder reactor "represents the most important innovation now available," another national technology, developed by CEA, looks very promising. This is a "nonproliferating" uranium enrichment process that is particularly worthwhile for nations that would refuse isotope separation installations (such as ultracentrifugation, for example) that might more easily lead to the production of military raw material. This "chemical" way--which is much easier than gaseous diffusion--enables a non-nuclear power, by means of a slight additional cost, to guarantee its supply or to add to the lifetime of its uranium sales [as published; stockpiles] without risk of proliferation.

Toward the Fusion Reactor

Parallel to the electric nuclear power program, R & D activities--especially under the aegis of CEA--give the entire sector a major promotion role in the industry. Bio-industry and biomedical engineering will benefit in particular from that through instrumentation on the basis of radioactive elements, radiation chemistry and biomedical analysis techniques. On the basis of the competence it has acquired in electronic remote handling, in information science and in shape recognition, CEA represents a major center in the robot field.

Knowledge and capability acquired in the area of work in a hostile environment also open up prospects for the techniques used in nodule harvesting. Basic research in microelectronics prepared the way to the future micronic or submicronic product lines, the study of magnetic-bubble memories and the study of the Josephson effect. In agribusiness, we might mention work on solar greenhouses, on separation methods using ultrafiltration and extraction by means of solvent and the use of radiation for food conservation. French nuclear research continues its feasibility studies on a nuclear electric reactor involving the use of fusion. "The new Tore-Supra machine, using the 'Tokomak' technique with superconducting magnets, with its more concentrated structures and its more advanced technology, will yield a higher performance than the European 'Jet' installed at Culham (Great Britain)," Jean Rastoin emphasized. "Furthermore, we hope that the next European installation in the fusion field will be set up at Cadarache (CEA)."

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CSO: 5100/2147

STRIKES HALT CONSTRUCTION WORK AT GRAVELINES, CRUAS

Paris LE FIGARO in French 17 Mar 82 p 13

[Text] The construction site of sections 5 and 6 of the Gravelines nuclear reactor is still blocked after 3 weeks by the workers of Thermatome, a subcontractor, who are on strike to obtain full payment for the days lost because of an earlier conflict.

About 2 months ago, the 2,000 salaried employees of SGE (Societe generale d'entreprises) [General Business Corporation], working to finish the shell of the last two sections, went on strike to demand the cancellation of 700 layoffs which were to occur at the end of February. They succeeded in getting these layoffs canceled and received a bonus equal to the amount of the strike days.

The other companies had laid off their personnel. Because of this, the strikers received more money that those who had been laid off. The latter, in order also to obtain the entire payment for the lost days--and not unemployment benefits, an anount which is clearly less--in their turn blocked the construction site, and it was the workers of SGE who found themselves in enforced idleness.

Last Monday, a week ago, the strikers, who were only letting the employees of EDF [Electric Power Company of France] in charge of production go through, clashed with management and supervisors who refused to let themselves be monitored. Production at the reactor was halted for 48 hours; then the strikers relaxed the controls and the reactor was recoupled to the network.

On Friday, negotiations took place with CGT [General Confederation of Labor] delegates from the construction site, management and inspectors. But it was not possible to reach an agreement. Yesterday the strikers reorganized the pickets but agreed, for the first time since the beginning of the conflict, to let the subcontractors' employees in charge of maintenance of two sections halted for technical reasons go past. A new joint meeting must take place. Each side hopes that a solution will be found at that time.

The interprofessional employers' union of the Dunkerque region stated in a communique issued yesterday that "the strike is a responsible act, [but] to pay for it is to make of it an irresponsible act," and it asks "the government

"in the most solemn manner that everything be set in motion so that a solution might be found to this conflict and so that, in this way, the companies and their workers might work without hindrance of any kind."

Far from the North, in the center of the country, another nuclear reactor under construction, at Cruas, is experiencing social conflict. On Tuesday morning, the workers of the Nord-France factory who are employed in the construction of the nuclear reactor at Cruas (Ardeche) blocked the entrance to the site where about 4,000 persons are working, it has been learned from a union source.

The 130 employees of Nord-France, which is building cooling towers, intend in this way to protest the almost certain layoffs of 107 of their number at the end of the job. According to the CGT, these workers had been hired on contracts of undetermined length.

After 13 Days of Strike

In contrast, the 1,600 workers employed on the nuclear reactor site at Cattenom (Moselle) voted 52 percent to return to work, following an agreement signed Monday night between the 10 company managers in charge of the construction work of sections 1 and 2 at the site and the delegates of the CGT, the only union represented, it has been learned from a union source.

The employees demanded that the reduction of their worktime be carried out by ending the workweek at noon on Friday, as well as by paying for a 13th month and adding a fifth week of paid vacation to the annual month of vacation.

After 13 days of strike, the agreement has given them partial satisfaction: the strikers have won their case for one Friday out of four, and the 13th month will be paid at 2,400 Fr as against the 3,000 Fr claimed. As the fifth week of paid vacation can be granted to them only between Christmas and the first of the year, according to legislation, the union members are going to demand the opening of negotiations with the Ministry of Energy and the EDF national leadership.

Moreover, the strikers who demanded a compensation of 50 percent of the strike days have obtained a compensation bonus of 500 Fr and an advance of 1,200 Fr to be repaid over 6 months.

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CSO: 5100/2133

PROBLEMS OF NUCLEAR WASTE STORAGE AT SAINT PRIEST

Paris LE MONDE in French 5 Mar 82 p 12

[Article by Marc Ambroise-Rendu: "The Question of Storage of Nuclear Waste Is To Be Taken Up Again in Its Entirety"]

[Text] "The plan for storing nuclear wastes in the town of Saint-Priest-la-Prugne (Loire), as it was presented in 1979, is unacceptable. The process of implementing it has been abandoned."

Those are the terms of the communique issued Wednesday 3 March by Edmond Herve, minister delegate to the Ministry of Industry for Energy, at the end of his 2-hour interview with a delegation of elected officials, scientists, and representatives from associations of the region concerned.

Does this mean that after 2 years of ferocious and almost unanimous opposition, the mayors and inhabitants of this upper region, located on the border of the departments of Allier and Loire, have obtained satisfaction on every point? It is not quite that simple.

Certainly the COGEMA project (Nuclear Materials General Company, a branch of the Atomic Energy Commission), which consisted of storing 300,000 cubic meters of atomic wastes of weak and moderate activity on the floor of a former uranium mine, is over. But the whole problem of radioactive residue remains. Therefore, the minister of energy has asked the AEC to prepare for him a comprehensive program for the management of these wastes, which apparently did not exist up until this time. This work should be finished in a few weeks and submitted for review to the Higher Council for Nuclear Safety.

Then, within this framework, the different storage sites existing in France, including that of Saint Priest, will be studied. The Bureau of Geological and Mining Research identified a dozen sites a few years ago. Many questions will be raised on this occasion: How to package the radioactive scrap? Must the wastes be stored on the surface or underground? Should the storage be permanent or temporary? How and by whom will the sites be monitored? In brief, the thorny question of "nuclear garbage" is to be considered from the beginning.

The choice of sites (two or three) would be reached in a year or 18 months. Herve has promised to make no decision without consulting local officials.

In any case, the sites decided upon will be endowed, like the reactors, with a monitoring commission composed of elected officials and association representatives. Finally, the minister has let it be known that, in conformance with the Socialist Party program, a nuclear law determining the powers and responsibilities of the various organizations managing nuclear energy would be introduced as soon as parliament's program permits.

Satisfaction

Upon leaving the Ministry of Energy, the people of Saint-Priest-la-Prugne--who had been received by the President 2 weeks ago--did not conceal their satisfaction. "The 1970 plan has been abandoned," declared Patrick Mann, leader of the Bois Noir collective. "All this is in response to the promises made by the Socialist candidates in April 1981. Politically, this is a very important advance. But that does not mean that every storage project in Saint Priest has been abandoned forever. As we are irreparably opposed to this idea, we will remain vigilant. We will rest easy only when the AEC has given ground."

The floor of the former uranium mine is still occupied by various buildings and shorings. The town of Saint Priest would like to set up lumber companies there which propose exploiting the immense forests of the Bois-Noir massif. There also remains a settling basin full of slightly radioactive sludge which it will be necessary to empty completely.

In this respect, the elected officials of Loire have learned that EDF [French Electric Power Company] had proposed installing a pumping station with two basins there. They have asked Herve for details on this equipment and were surprised not to have been informed earlier. "As long as the threat of a nuclear garbage can weighs on our territory, we will be able to undertake nothing; neither business installations nor tourist development, nor even a hydroelectric plant. It is necessary to be done with it as soon as possible," they concluded.

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CSO: 5100/2133

BRIEFS

PRONUCLEAR MOVEMENT IN BRITTANY--Saint Brieuc--"Plogoff is finished, but there is nothing but Plogoff in Brittany." Created last October, the France-Energy-Business [FEE] association, which has just opened a Breton branch in Saint-Brieuc, has proposed as its program to "defend the interests of businesses working for nuclear energy." For Travers, the president of the regional Chamber of Commerce and Industry, who welcomed the delegates from FEE and at the same time around 20 heads of businesses or professional representatives, it is the whole development of the Breton economy that is at stake in this energy problem. On the single level of employment (Plogoff would have represented 1,200 direct jobs over 6 years), the reduction of the electro-nuclear program has not been compensated for by any substitute program, particularly in Brittany, say the heads of business. Whereas, according to Lalitte, a member of the FEE office, Paluel and Penli in Upper Normandy have or are going to have direct repercussions estimated at between 1.6 and 3 billion francs. Starting from the principle that the decision taken will be in effect only over a 2-year period and that their arguments on the subject of employment and the economy would have found a favorable hearing in the ministries, the leaders of FEE have decided to adapt their strategy accordingly. After having established itself in Normandy and the East, the association now has two Breton delegates, Messrs Michel (Metallurgical Society of Brittany, Saint-Brieuc) and Lambremont (Regional Federation of Public Works in Rennes), and is preparing for a March release of a Lou Harris poll on the loss of jobs in the electro-nuclear program and for an April meeting in Lyon: "For 1982 and 1983, it's over. After that, not only is nothing lost, but everything is possible." [Text] [Paris LE MONDE in French 5 Mar 82 p 12] 9865

CSO: 5100/2133

BRIEFS

TERRORISM IMMOBILIZES NUCLEAR PLANT--Madrid, 11 May (AFP)--The military wing of the Basque separatist movement ETA has scored a major victory by rendering technicians at the Lemoniz nuclear power plant, crucial to Spain's energy supply, too terrified to work. Following the murder last week of technical director Angel Pascual Mugica, 90 technicians of the Iberduero Company went on strike yesterday. Iberduero owns the power plant, under construction near Bilbao in the Basque region of north Spain. Despite appeals from the Autonomous Basque Government not to yield to "terrorist blackmail," the technicians said in a communique that they could not live with "an unbearable family, personal and professional situation." Iberduero technicians, forced to live clandestinely, are tormented by both the fear of losing their jobs if they refuse to work and of being attacked. Since 1977, two engineers and three workers at the Lemoniz plant have been killed by ETA-M, the military wing of ETA, and frequently employees receive death threats. The killing of Mr Mugica occurred on the day that management of the Lemoniz plant was placed under the authority of the Basque Autonomous Government and no longer under Madrid. Since 1977 also, the terrorist organization has carried out 300 attacks against the plant and other Iberduero installations, causing damage estimated at about 29 million dollars. [Excerpt] [NC111556 Paris AFP in English 1528 GMT 11 May 82]

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